

REMARKS

Claims 1-19, 21-27, 30-35, 37-40, 42 and 43 are currently pending in the above-identified application. Claims 1-8, 12-29 and 36-44 have been rejected, and claims 9-11 and 30-35 have been objected to. Claims 21, 30, 33, 37 and 42 have been amended and claims 20, 28, 29, 36, 41 and 44 have been canceled. Applicant respectfully requests reconsideration in light of the foregoing amendments and following remarks.

The Office action has questioned whether an Information Disclosure Statement (IDS) was indeed filed in the present application on May 2, 2001, since the Office cannot locate the IDS. Applicants enclose herewith a copy of the IDS, including form PTO/SB/08A, filed on May 2, 2001. Further, applicants enclose a copy of the stamped postcard receipt evidencing the Office's receipt of the IDS on May 2, 2001.

Claims 19-27, 36, 37 and 39-44 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Hibbs et al. Claims 21, 37 and 42 have been amended. Claims 20, 36, 41 and 44 have been canceled, thus rendering the rejection moot as to those claims.

Hibbs et al. discloses to a method of making a rim-type phase-shift mask. The mask made by the method of Hibbs et al. includes a substrate 112 upon which a layer of opaque material 120 is located. A portion of the opaque material 120 has been removed, as has a portion of the substrate 112.

Claim 19 is a product-by-process claim reciting a mask formed by the method of claim 1. A mask formed by the method of claim 1 includes "a first layer of material [formed] over a substrate" and "an opaque layer overlying said first layer of material, said opaque material layer having at least one opening therein filled with a second material, said

second material residing over said first layer material and defining areas of said first layer of material which are to be removed”.

Hibbs et al. fails to teach or suggest “an opaque layer overlying said first layer of material” as recited in claim 19. Instead, Hibbs et al. teaches an opaque layer 120 positioned directly on a substrate 112 and provides absolutely no disclosure related to a first layer positioned between the substrate and the opaque layer.

As noted above, claim 20 has been canceled. Claims 21-27 now depend from claim 30, which has been amended to include the features of claims 20, 28 and 29. The Office action states in paragraph 8 that claim 30 is objected to but would be rewritten in independent form including all the limitations of the base and any intervening claims. Applicants have so amended claim 30, and applicants submit that claim 30, and its dependent claims 21-27 are patentable over the cited reference.

Claim 37 recites a “mask comprising at least one printable area which is self-aligned with respect to an adjacent phase shift area”. The mask includes “a substrate”, “a layer located over said substrate, the adjacent phase shift area being formed in said layer” and “an opaque layer over said layer”. Claims 39, 40, 42 and 43 depend from claim 37.

Hibbs et al. fails to teach or suggest a mask with a substrate and an opaque layer sandwiching a first layer, and thus claims 37, 39, 40, 42 and 43 cannot be anticipated by that reference.

Claims 1-8, 12-18, 28, 29 and 38 stand rejected under 35 U.S.C. §103 as being unpatentable over Hibbs et al. Claims 28 and 29 have been canceled, thus rendering the

rejection moot as to those claims. Applicants respectfully traverse the rejection as it applies to claims 1-8, 12-18 and 38.

Claim 1 recites a method of forming a mask. The method includes “forming a first layer of material over a substrate”, “forming an opaque layer overlying said first layer of material, said opaque material layer having at least one opening therein filled with a second material, said second material residing over said first layer of material and defining areas of said first layer of material which are to be removed”, “using said second material as a mask to remove said areas of said first layer of material” and “removing said second material”.

Claims 2-8 and 12-18 depend from claim 1.

Hibbs et al. fails to teach or suggest “forming an opaque layer overlying said first layer of material” as recited in claim 1, and thus claims 1-8 and 12-18 cannot be obvious in light of Hibbs et al.

Claim 38 depends from claim 37. As noted above, Hibbs et al. fails to teach or suggest “a layer located over said substrate” and “an opaque layer over said layer”, and thus claim 38 cannot be obvious in light of Hibbs et al.

Claims 9-11 and 30-35 stand objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base and any intervening claims. Applicants submit that, for at least the reasons provided above, claims 9-11, which depend from claim 1, are patentable over Hibbs et al. Claim 30 has been amended as suggested by the Examiner, and thus claims 30-35 should now be allowable.

For at least the reasons advanced above, each of the presently pending claims is in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Dated: January 17, 2003

Respectfully submitted,

By: 

Thomas J. D'Amico

Registration No. 28,371

William E. Powell III

Registration No. 39,803

DICKSTEIN SHAPIRO MORIN &

OSHINSKY, LLP

2101 L Street, NW

Washington, DC 20037-1526

Attorneys for Applicants

VERSION WITH MARKINGS TO SHOW CHANGES MADE

Claims 21, 30, 33, 37 and 42 have been rewritten and claims 20, 28, 29, 36, 41 and 44 have been canceled.

Cancel claim 20.

21. (Amended) The method of claim [20] 30, wherein the using of said first material as a mask comprises providing at least one first region from which said opaque material is removed, and the removing of said first material comprises providing at least one second region from which said first material is removed, said first and second regions having different phase shift characteristics with respect to light transmitted therethrough.

Cancel claims 28 and 29.

30. (Amended) [The method of claim 29,] A method of forming a mask, comprising:
forming an opaque layer over a substrate, said opaque layer having at least one opening therein filled with a first material, said first material defining areas of said substrate which are to be removed, said forming comprising:

depositing a first resist material on said opaque layer;
removing a portion of said first resist material, leaving said opening;
etching an uncovered portion of said opaque layer underlying the removed
portion of said first resist material, thereby deepening said opening a first time; and
removing the remainder of said first resist material;
etching the substrate defined by said deepened opening, thereby deepening said
opening a second time;
using said first material as a mask to remove said areas of said substrate, wherein the
using of said first material as a mask comprises:
 providing said first material within said twice deepened opening and over said
 opaque layer;
 directing a first exposure through said substrate to expose a portion of said
 first material;
 hardening the exposed portion of said first material;
 directing a second exposure at said first material to remove any unhardened
 portions of said first material;
 providing a second material over said opaque layer and said hardened portion
 of said first material;
 performing a lithographic step on a portion of said second material overlying
 and bounded by said first material to expose and remove said portion of said second
 material; and
 etching said opaque layer underlying said exposed and removed portion of

said second [material] material; and
removing said first material.

33. (Amended) The method of claim [28] 30, wherein the using of said first material as a mask comprises:

providing said first material within said deepened opening and over said opaque layer;

directing a first exposure through said substrate to expose a portion of said first material;

baking said first material to harden the exposed portion of said first material;

directing a second exposure at said first material to remove any unhardened portions of said first material;

providing a second material over said opaque layer and said hardened portion of said first material;

performing a lithographic step on a portion of said second material overlying and bounded by said first material to expose and remove said portion of said second material; and

etching said opaque layer underlying said exposed and removed portion of said second material.

Cancel claim 36.

37. (Amended) A mask comprising at least one printable area which is self-aligned with respect to an adjacent phase shift [area] area, said mask including:

a substrate;

a layer located over said substrate, the adjacent phase shift area being formed in said layer; and

an opaque layer over said layer.

Cancel claim 41.

42. (Amended) The mask of claim [41] 37, wherein said printable area is located within said substrate and said adjacent phase shift area is located in said opaque layer.

Cancel claim 44.